

### Abstract

5 The invention features an exhalation assist device for adjusting the airway resistance in an exhalation circuit of a medical ventilator. The device includes a set of pressure, airflow and airway sensors, a controlling processor, a user interface, and a ventilatory unit in communication with a medical ventilator. Data relating to pressure within the ventilatory unit and data relating to exhalation airflow, exhalation circuit pressure and exhalation circuit resistance are provided to the controlling processor by the sensors. The controlling processor compares measured and calculated values for airway pressure, airflow, airway resistance and applied negative pressure with desired values that have been entered by a clinician. Based on these calculations, the controlling processor transmits a signal that will change the applied negative pressure applied to the exhalation circuit by the ventilatory unit. The amount of negative pressure applied during the breathing cycle is varied by the controlling processor so that the amount of exhalation assist increases proportionately with the amount of exhalation flow and so that the amount of pressure within the patient airway remains constant at a level greater than zero and less than PEEP.

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